THE EFFECT OF INTRINSIC AND EXTRINSIC FACTORS TO THE PHLEBITIS DEVELOPMENT IN PATIENT WITH INTRA VENOUS THERAPY IN EMERGENCY ROOM IMMANUEL HOSPITAL, BANDUNG

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ABSTRACT

Background: Phlebitis is a secondary infection that causes inflammation of the vein, because of chemical irritation and irritation caused by IV procedures. Report from Ministry of Health Republic of Indonesia showed that the number of phlebitis incident according to distribution of circulation diseases in Indonesia is 744 patients (17.11%). Data from Immanuel Hospital (2011) showed an 1.17% increasing rate of phlebitis every trimester.

Aim: This study aimed to recognize the effect of intrinsic and extrinsic factors to the phlebitis development in patient with IV therapy at Emergency Room Immanuel Hospital Bandung. 

Materials and Method: This study was a quantitative research, an analytical descriptive, using prospective design. Sample selection method was consecutive sampling to all emergency room patients with IV installation. Sample analysis was conducted on the third day using VIP (Visual Infusion Phlebitis) Score.

Results: The result of this study showed that 19.2% of patients with IV therapy in emergency room has developed phlebitis, while 80.8% others were free from phlebitis. Statistic output from intrinsic factors analysis using Chi Square Test with level of confidence 95% showed that there were significant effect of age (p=0.026), gender (p=0.038) and accompanying disease (p=0.010) to develop phlebitis. From extrinsic factors analysis, in terms of devices there were significant effect of the injection drug pH (p=0.001) to development of phlebitis, while extrinsic factors, in terms of nurse as health worker in conducting IV, showed that work experience (p=0.001) and nurse’s attitude (p=0.001) effect the development of phlebitis. In the binary logistic regression test, there was a significant relationship between phlebitis and the pH of injection drug with p value = 0.001 (OR 4.98 CI 95%), accompanying disease with p value = 0.006 (OR 4.303 CI 95%), patient’s gender with p value = 0.013 (OR 3.41 CI 95%) and nurse’s attitude with p value = 0.017 (OR 3.07 CI 95%).

Conclusion: Some of the data from this research indicated that at the most the intrinsic and extrinsic factors affected the phlebitis development. The effect of age, gender, and accompanying disease were the factors that was difficult to change, but it can be anticipated with the nurse’s knowledge associated with the location and techniques of installing the IV correctly. Other things that affect the phlebitis development were the external factors, including the pH of injection drug fluid, nurse’s work experience and nurse’s attitude. The pH of injection drug fluid certainly can’t be changed, because every doctor had their own consideration in determining which drugs given to the patient. This can be anticipated by selection of the IV location at the larger vein, in addition to mix the injection drug fluid properly. Nurse’s attitude was a factor that can be changed through various activities such as proper hand washing training and awareness to obey the Standard Operating Procedures.

Keywords: Phlebitis, Infusion Therapy, Infection of the hospital, VIPScore

I. INTRODUCTION

Infection control and prevention is one of the quality standard of health care in hospitals. Nosocomial infection is an
infection acquired within 3 x 24 hours since the admission time to the hospital and can be transmitted from healthcare team member, other patients, equipment or substances used for therapy, and even from the hospital environment. The administration of intravenous therapy fluids in Emergency Room is a life saving action for patients with fluid loss, dehydration and shock. Frequently, the complication of intravenous therapy is phlebitis. Phlebitis is a condition when the vein is swelling, caused by chemical irritation, mechanic, or bacteria. Phlebitis is a secondary infection that causes inflammation of the vein, because of chemical irritation and irritation caused by IV procedures. The risk rate of phlebitis in hospitals in Indonesia is still high. Report from Ministry of Health Republic of Indonesia showed that the number of phlebitis incident according to distribution of circulation diseases in Indonesia is 744 patients (17,11%). Dr. Soedarso General Hospital recorded that there were 252 patients (1.1%) suffered from phlebitis out of 23.258 patients at 2011. Data from Immanuel Hospital (2011) showed an 1.17% increasing rate of phlebitis every trimester.

This study aimed to recognize the effect of intrinsic and extrinsic factors to the phlebitis development in patient with IV therapy at Emergency Room Immanuel Hospital Bandung.

II. METHOD
A. Instrument
Instruments used for this research includes:
1. Patient Characteristic Sheet as the intrinsic factors analysis
2. Questionnaire and observational sheet of the nurses as the extrinsic factor
3. Nurse’s attitude questionnaire (validity and reliability are tested)
4. Nurse’s knowledge questionnaire (validity and reliability are tested)
5. Nurse’s skill in IV installation observational sheet
6. Observational sheet of liquids and devices used as the extrinsic factors
7. VIP score observational sheet

B. Data Collecting
This study was a quantitative research, an analytical descriptive, using prospective design. Sample selection method was consecutive sampling to all emergency room patients with IV installation. Sample analysis was conducted on the third day using VIP (Visual Infusion Phlebitis) Score.

Inclusion criteria:
- Patient with 14 years old and above, admitted at emergency room with IV administered.
- Patient with intravenous catheter in peripheral region, with prediction of being hospitalized more than 72 hours.
- Patients in internal medicine wards (Beria, Elizabeth, Filipus, Gideon, Hana and Lukas)

Exclusion criteria:
- Patients with allergic history
- Patients that hospitalized less than 72 hours
- Patient was in chemotherapy

The sample size calculation in this study based on multivariate sample size formulation (multiple logistic regression analysis), named rule of thumbs. In this rule, the sample size is ten times of the number of independent variables (Dahlan, 2009).
There were 17 sub variables in this study, therefore the total sample was 170 patients. Sub variables to be studied included the intrinsic factors of the patients, such as age, gender, nutritional status, smoking habit, accompanying disease and IV location. Extrinsic factors included fluid and devices used, such as intravenous catheter needle size, intravenous fluids type, intravenous fluids osmolarity and the pH of the injection drug. Other than that, the characteristic of the nurses as the extrinsic factors, such as age, education, employment, knowledge, skill and attitude toward IV administration procedure was also studied.

C. Data Analysis
Data analysis process included data editing, coding, entry and cleaning, using computer software (SPSS). The analysis process was conducted in three steps:
1. Univariate analysis, to describe each variable in the study
2. Bivariate analysis, to analyze the factors that affect phlebitis, using two sided test at alpha 0.05 level with Chi Square test for two categorical data group, and T-test for numerical data
3. Multivariate analysis, performed by correlating the multiple independent variables with a dependent variable simultaneously (Hastono, 2007). Multivariate analysis used in this study was the multiple logistic regression analysis, because the data of dependent variable was a categorical dichotomy data.

III. RESULT
The result of this study showed that 19.2% of patients with IV therapy in emergency room has developed phlebitis, while 80.8% others were free from phlebitis. Statistic output from intrinsic factors analysis using Chi Square Test with level of confidence 95% showed that there were significant effect of age (p=0.026), gender (p=0.038) and accompanying disease (p=0.010) to develop phlebitis.

From extrinsic factors analysis, in terms of devices there were significant effect of the injection drug pH (p=0.001) to development of phlebitis, while extrinsic factors, in terms of nurse as health worker in conducting IV, showed that work experience (p=0.001) and nurse’s attitude (p=0.001) effect the development of phlebitis.

In the binary logistic regression test, there was a significant relationship between phlebitis and the pH of injection drug with p value = 0.001 (OR 4.98 CI 95%), accompanying disease with p value = 0.006 (OR 4.303 CI 95%), patient’s gender with p value = 0.013 (OR 3.41 CI 95%), and nurse’s attitude with p value = 0.017 (OR 3.07 CI 95%).

IV. DISCUSSION
In this study, the results of the Chi Square Test analysis on level of confidence 95% showed that there were a significant relationship between age with phlebitis development in patient with IV therapy in emergency room at Immanuel Hospital Bandung with p value = 0.026 (p value ≤ 0.05). This result is supported by previous research by Nassaji-Zavareh & Ghorbani (2008) stated that the factor of age less than 60 years also risky for phlebitis as much as 27.8% (OR 6.21 CI 95%).

Through the bivariate analysis, it was found that 26.5% of women had phlebitis while men was only 14.1%. From the analysis of Chi Square Test based on gender, it was found that there was a relationship between gender and phlebitis development
in patient with IV therapy in emergency room at Immanuel Hospital Bandung with p value = 0.038 (p value ≤ 0.05). From the multiple logistic regression analysis, it was found that gender significantly affected phlebitis with p value = 0.013 (value p ≤ 0.05) and 3.4 times greater risk of phlebitis (OR 3.41 CI 95%). This result was supported with the study conducted by Dannis, Maki & Marlyn (1991) that women have a higher risk of phlebitis with relative risk of 1.88. Theoretically it was said that women had higher levels of the estrogen that affects the immune system. In addition the estrogen also affected the female blood vessel capillaries.

Chi Square Test result on 95% level of confidence based on smoking habits showed that smoking habit had no effect to the incidence level of phlebitis (p = 0.264). While in other research conducted by Andrea, mentioned that smoking habit had a significant relationship (p = 0.054) with incidence of phlebitis.

Results from the analysis of accompanying disease were important to be observed because more than half of the respondents (58.7%) were patients with infectious diseases. This is supported by the study from Nassaji-Zavareh & Ghorbani (2008) who said that patients with infectious diseases were at risk of phlebitis. Analysis of the accompanying disease showed that there was a relationship between accompanying disease and phlebitis development in patients with IV therapy in emergency room at Immanuel Hospital Bandung with p< 0.0010 (p ≤ 0.05). This was consistent with the theory, that patients with infectious diseases will have a higher chance of occurrence of phlebitis because they were in a weak and infected conditions, coupled with intravenous catheter insertion as port-of-entry germs that will lead to phlebitis (Perry & Potter, 2001). The multiple logistic regression analysis resulted that the accompanying disease as the second main factor that significantly affected the phlebitis development with p = 0.006 (p value ≤ 0.05) and 4.3 times greater risk of phlebitis (OR 4.3 CI 95%). The study of Nassaji-Zavareh & Ghorbani (2008) also proved that the accompanying disease factor had 6 times more risk of phlebitis (OR 6.21 CI 95%) and the frequency of infectious disease of patients with phlebitis was up to 74.6%.

Extrinsic factors, such as IV location, intravenous catheter size and infusion fluid based on Chi Square Test analysis on 95% level of confidence had no effect on phlebitis development. Whereas previous study said that the IV location affected 3 times greater to the incidence rate of phlebitis (OR 3.25 CI 95%) especially if it was located on the backs of the hands, which as much as 72.9% will experienced phlebitis (Nassaji-Zavareh & Ghorbani, 2008). A journal which titled "Experimental infusion phlebitis: tolerance pH of Peripheral Vein" said that the acidity tolerance on the peripheral vein is 6.5, but Angeless (in Gayatri & Handiyani, 2003) said that infection can be caused by drug irritation or acidic intravenous fluids ( < 5 ) or alcalic intravenous fluids ( > 9 ).

The result of Chi Square Test analysis at 95% level of confidence stated that there was relationship between injection drug’s pH with the phlebitis development (p = 0.001). Multiple logistic regression analysis showed that at the first place, the pH of the injection drug affected the incidence of phlebitis with the coefficient value of β 1.606 (p = 0.001) and had 4.9 times greater risk of phlebitis (OR 4.98 CI 95%). Therefore, it should be notice that the pH of the acidic drug fluid may irritate the blood vessel...
tissue. The nurses must be more responsive to the techniques on how to administer the drug injection correctly. This is supported by the journal entitled “Experimental infusion phlebitis: tolerance pH of Peripheral Vein” in the Journal of Infusion Nursing (Kuwahara, T. 1999), that mentioned that drugs administered through intravenous catheters especially when given repeatedly with an infusion pump can affect the phlebitis incident.

The results of the frequency distribution analysis of the nurses at emergency room is rated based on their age, education, employment, education and attitudes on nurses who administer IV at emergency room of Immanuel Hospital Bandung showed that there was no effect of age, education, employment and nurse education to the incidence of phlebitis, while the nurse’s attitude has an effect on the incidence of phlebitis. Chi Square Test analysis results at 95% level of confidence stated that there was relationship between nurse’s attitude and the incidence of phlebitis (p = 0.009). Multivariate analysis of multiple logistic regression found that in the fourth position, nurse’s attitude greatly affect the incidence of phlebitis with coefficient value $\beta$ 1,123 (p = 0.017) and 3 times greater risk of phlebitis (OR 3.07 CI 95%). Pasaribu's research (2006), at Haji Hospital Medan stated that the most dominant cause of phlebitis is poor nurse’s attitude during IV administration (OR = 2,771 CI 95%).

V. CONCLUSION

Some of the data from this research indicated that at the most the intrinsic and extrinsic factors affected the phlebitis development. The effect of age, gender, and accompanying disease were the factors that was difficult to change, but it can be anticipated with the nurse’s knowledge associated with the location and techniques of installing the IV correctly.

Other things that affect the phlebitis development were the external factors, including the pH of injection drug fluid, nurse’s work experience and nurse’s attitude. The pH of injection drug fluid certainly can’t be changed, because every doctor had their own consideration in determining which drugs given to the patient. This can be anticipated by selection of the IV location at the larger vein, in addition to mix the injection drug fluid properly.

Nurse's attitude was a factor that can be changed through various activities such as proper hand washing training and awareness to obey the Standard Operating Procedures.

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VII. REFERENCE

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